

WHAT IS CLAIMED IS:

1. A method of detecting the concentration or expression level of *FCR3.varCSA* or *FCR3.varCSA* in a biological sample from a tested subject comprising the step of comparing the concentration or expression level of a first sequence selected from the group consisting of *FCR3.varCSA* gene, *FCR3.varCSA* RNA, *FCR3.varCSA* cDNA, and *FCR3.varCSA* polypeptide from the biological sample with the concentration or expression level of a second sequence selected from the group consisting of *FCR3.varCSA* gene, *FCR3.varCSA* RNA, *FCR3.varCSA* cDNA, and *FCR3.varCSA* polypeptide from a healthy subject or *FCR3.varCSA* gene, *FCR3.varCSA* RNA, *FCR3.varCSA* cDNA, and *FCR3.varCSA* polypeptide from a subject afflicted with malaria.
2. A method of making a *FCR3.varCSA* disease-state profile comprising:
  - providing a biological sample; and
  - detecting in the biological sample a concentration or expression level of *FCR3.varCSA* or *FCR3.varCSA*.
3. A purified or isolated nucleic acid comprising the sequence of SEQ ID NO: 1 or a sequence complementary thereto.
4. A purified or isolated nucleic acid comprising at least 9 consecutive bases of the sequence of SEQ ID NO.: 1 or a sequence complementary thereto.
5. The purified or isolated nucleic acid of Claim 4, wherein said nucleic acid comprises a DBL3 domain or CIDR1 domain or fragment thereof.
6. A purified or isolated nucleic acid comprising at least 9 consecutive bases of the sequence of SEQ ID NO.: 1, wherein the nucleic acid has a nucleotide sequence found in a *var* gene that encodes a protein that binds to chondroitin sulfate A that is at least 80% homologous to *FCR3.varCSA* or a sequence complementary to SEQ. ID. NO.: 1 or said *var* gene.
7. A purified or isolated nucleic acid encoding a polypeptide having the sequence of SEQ ID NO.: 2.
8. A recombinant construct comprising the coding region of SEQ ID NO.: 1 operably linked to a heterologous promoter.

9. A vector comprising the isolated DNA of Claim 3.
10. A vector comprising the isolated DNA of Claim 5.
11. An isolated nucleic acid molecule that hybridizes to SEQ. ID. NO. 1 at 37°C in the presence of 0.5M NaPO<sub>4</sub> (pH 7) and 7% SDS and under wash conditions of 37°C, in 6X SSC and 0.2% SDS, wherein the nucleic acid molecule has a sequence complementary to a sequence found in a *var* gene that encodes a protein that binds to chondroitin sulfate A that is at least 80% homologous to *FCR3.varCSA*.
12. A purified or isolated protein comprising the sequence of SEQ ID NO.: 2.
13. The purified or isolated protein of Claim 12, wherein at least one acidic amino acid contained therein is replaced with a different acidic amino acid.
14. The purified or isolated protein of Claim 12, wherein at least one basic amino acid contained therein is replaced with a different basic amino acid
15. The purified or isolated protein of Claim 12, wherein at least one nonpolar amino acid contained therein is replaced with a different nonpolar amino acid.
16. The purified or isolated protein of Claim 12, wherein at least one uncharged amino acid contained therein is replaced with a different uncharged amino acid.
17. The purified or isolated protein of Claim 12, wherein at least one aromatic amino acid contained therein is replaced with a different aromatic amino acid.
18. A purified or isolated polypeptide comprising at least 3 consecutive amino acids of the sequence of SEQ ID NO.: 2, wherein the polypeptide binds to chondroitin sulfate A (CSA).
19. A purified or isolated polypeptide comprising at least 3 consecutive amino acids of the sequence of SEQ ID NO.: 2, wherein the amino acid sequence of the polypeptide is found in molecule that binds to chondroitin sulfate A (CSA) that is at least 80% homologous to *FCR3.varCSA*.
20. A purified or isolated polypeptide, wherein the polypeptide is at least 80% identical to the polypeptide having the amino acid sequence of SEQ. ID. NO. 1 as determined by FASTA or BLAST using default opening and gap penalties and a PAM 250 scoring matrix.

21. A purified or isolated polypeptide comprising a DBL3 or CIDR1 domain or fragment thereof consisting of at least 9 amino acids of SEQ. ID. No.:2.

22. A method of making a protein having the sequence of SEQ ID NO.: 2 comprising:

obtaining a cDNA comprising the sequence in SEQ ID NO.: 1;

inserting said cDNA in an expression vector such that said cDNA is operably linked to a promoter; and

introducing said expression vector into a host cell whereby said host cell produces the protein encoded by said cDNA.

23. The method of Claim 22, further comprising isolating the protein.

24. An isolated FCR3.varCSA polypeptide that promotes adhesion to CSA wherein the polypeptide is selected from the group consisting of:

(a) a polypeptide having the amino acid sequence of SEQ. ID NO. 2

(b) a polypeptide encoded by the nucleic acid of Claim 3, 4, 5, 6, or 7; and

(c) a polypeptide that is at least 70% identical to the polypeptide of (a) or (b) as determined by FASTA or BLAST using default opening and gap penalties and a PAM 250 scoring matrix.

25. A method for constructing a transformed host cell that expresses SEQ ID NO.: 3 comprising transforming the host cell with a recombinant DNA vector comprising the sequence of SEQ ID NO.: 1.

26. A cultured cell line comprising the vector of Claim 9.

27. A cultured cell line comprising the vector of Claim 10.

28. A purified or isolated antibody capable of specifically binding FCR3.varCSA, wherein the antibody recognizes an epitope found on a var protein that binds to chondroitin sulfate A that is unique to a class of var proteins having a structure that is at least 80% homologous to FCR3.varCSA.

29. The antibody of Claim 28, wherein the antibody is a monoclonal antibody.

30. A purified or isolated antibody that binds DBL3 or CIDR1 of SEQ. ID. No. 2.

31. The antibody of Claim 30, wherein the antibody is a monoclonal antibody.

32. An isolated or purified biological complex comprising FCR3.varCSA and a ligand for FCR3.varCSA.

33. An isolated or purified biological complex comprising a molecule selected from the group consisting of FCR3.varCSA, a fragment of FCR3.varCSA, A4 tres DBL3- $\gamma$ , and ItG2-CS2 DBL2- $\gamma$  joined to chondroitin sulfate A (CSA) or an analog thereof.

34. A method of identifying FCR3.varCSA dependent adhesion to chondroitin sulfate A (CSA) comprising:

providing a support having chondroitin sulfate A (CSA) or a representative fragment thereof;

contacting the support with FCR3.varCSA or a representative fragment thereof; and

detecting FCR3.varCSA dependent adhesion.

35. The method of Claim 34, wherein the support is selected from the group consisting of a resin, a plastic reservoir, a lipid bilayer, and a cell.

36. The method of Claim 34, wherein the FCR3.varCSA is joined to a second support selected from the group consisting of a resin, a plastic reservoir, a lipid bilayer, and a cell.

37. A method of identifying an agent that modulates FCR3.varCSA dependent adhesion to chondroitin sulfate A (CSA) comprising:

providing a support having chondroitin sulfate A (CSA) or a representative fragment thereof;

contacting the support with FCR3.varCSA or a representative fragment thereof;

contacting the support with the agent; and

detecting FCR3.varCSA dependent adhesion.

38. The method of Claim 37, wherein the support is selected from the group consisting of a resin, a plastic reservoir, a lipid bilayer, and a cell.

39. The method of Claim 37, wherein the FCR3.varCSA is joined to a second support selected from the group consisting of a resin, a plastic reservoir, a lipid bilayer, and a cell.

40. A method of identifying an agent that modulates FCR3.varCSA dependent adhesion to chondroitin sulfate A (CSA) comprising:

providing a support having FCR3.varCSA or a representative fragment thereof that has a polypeptide sequence found in a var protein that binds to chondroitin sulfate A and is at least 80% homologous to FCR3.varCSA.;

contacting the support with the agent; and

detecting FCR3.varCSA dependent adhesion to chondroitin sulfate A (CSA).

41. The method of Claim 40, wherein the FCR3.varCSA is joined to a second support selected from the group consisting of a resin, a plastic reservoir, a lipid bilayer, and a cell.

42. The method of Claim 40, wherein the support is selected from the group consisting of a resin, a plastic reservoir, a lipid bilayer, and a cell.

43. The method of Claim 40, wherein the CSA is joined to a second support selected from the group consisting of a resin, a plastic reservoir, a lipid bilayer, and a cell.

44. A method of identifying an agent that modulates FCR3.varCSA dependent adhesion to chondroitin sulfate A (CSA) comprising:

providing a cell transfected with a construct comprising a nucleic acid sequence encoding FCR3.varCSA or a representative fragment thereof that has a nucleotide sequence found in a *var* gene that encodes a protein that binds to chondroitin sulfate A that is at least 80% homologous to *FCR3.varCSA*;

contacting the cell with the agent; and

detecting FCR3.varCSA dependent adhesion to chondroitin sulfate A (CSA).

45. A method of identifying an agent that interacts with the sequence set forth in SEQ ID NO.: 2 or a representative fragment thereof that has an amino acid sequence not found in another var protein comprising:

transfecting a cell with a nucleic acid encoding the sequence set forth in SEQ ID NO.: 1 or 2 or a representative fragment thereof that has a nucleotide sequence encoding FCR3.varCSA or a representative fragment thereof that has a nucleotide sequence found in a *var* gene that encodes a protein that binds to chondroitin sulfate A that is at least 80% homologous to *FCR3.varCSA*;

contacting the cell with the agent; and

detecting an interaction of the agent and a polypeptide encoded by the sequence set forth in SEQ ID NO.: 2 or a representative fragment thereof that has a nucleotide sequence found in a *var* gene that encodes a protein that binds to chondroitin sulfate A that is at least 80% homologous to *FCR3.varCSA*.

46. A method of preparing a therapeutic agent comprising:

providing an agent that modulates FCR3.varCSA-dependent adhesion to CSA; and

mixing with the agent a pharmaceutically acceptable carrier.

47. A pharmaceutical comprising an antibody of Claims 28, 29, 30, or 31 or an agent identified according to any one of Claims 37-46 and a pharmaceutically acceptable carrier.

48. A method of treatment and prevention of maternal malaria comprising:

identifying a patient at risk for contracting maternal malaria or a patient afflicted with maternal malaria; and

administering a therapeutically effective amount of a nucleic acid complementary to at least 15 consecutive nucleotides of SEQ. ID. NO. 1, wherein the nucleic acid is complementary to a sequence encoding FCR3.varCSA or a representative fragment thereof that has a nucleotide sequence found in a *var* gene that encodes a protein that binds to chondroitin sulfate A that is at least 80% homologous to *FCR3.varCSA*.

49. The method of Claim 48 further comprising administering a pharmaceutically acceptable carrier or adjuvant.

50. A method of treatment and prevention of maternal malaria comprising:

5 identifying a patient at risk for contracting maternal malaria or a patient afflicted with maternal malaria; and

administering a therapeutically effective amount of a polypeptide having at least 3 consecutive amino acids of SEQ. ID. NO. 2, wherein the amino acid sequence is found in a protein that binds chondroitin sulfate A that is at least 80% homologous to FCR3.varCSA.

10 51. The method of Claim 50, further comprising administering a pharmaceutically acceptable carrier or adjuvant.

52. A method of treatment and prevention of maternal malaria comprising:

15 identifying a patient at risk for contracting maternal malaria or a patient afflicted with maternal malaria; and

administering a therapeutically effective amount of a peptide agent that corresponds to at least 3 consecutive amino acids of SEQ. ID. NO. 2, wherein the amino acid sequence is found in a protein that binds chondroitin sulfate A that is at least 80% homologous to FCR3.varCSA.

20 53. The method of Claim 52, further comprising administering a pharmaceutically acceptable carrier or adjuvant.

54. A method of treatment and prevention of maternal malaria comprising:

25 identifying a patient at risk for contracting maternal malaria or a patient afflicted with maternal malaria; and

administering a therapeutically effective amount of a peptide agent that corresponds to at least 3 consecutive amino acids of SEQ. ID. NO. 9 or 11, wherein the amino acid sequence is found in a protein that binds chondroitin sulfate A.

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55. The method of Claim 54, further comprising administering a pharmaceutically acceptable carrier or adjuvant.

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